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John A. Miller

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IN SCHOOL OF NATURAL HISTORY.

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TOPOGRAPHY OF ILLINOIS.

Geo. E. Wilkinson.

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Class of '90.

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TOPOGRAPHY OF ILLINOIS.

The plan of this thesis consists of a written description of the surface features of the State, and a "relief map" , found in the Natural History Museum.

In securing the data for this work, I am under many obligations to Mr. C. W. Rolfe, Professor of Geology in the University of Illinois, who has so kindly and greatly aided me in obtaining the surveys of railroads and works of other engineers.

In the preparation of the map, a twofold effort has been attempted. First. To show the general drainage system of the State; and second, To show the general relation between its surface and the underlying geological formations.

To accomplish the first, a persistent attempt has been made to secure the surveys and levels of every railroad in the State, the surveys made by the "Mississippi River Commission," the "United States Geodetic Surveys," and private and local surveys.

To accomplish the second much time has been spent in studying the Geological Surveys of Illinois, and the Geological map published by A. H. Worthen.

The colors of the map represent as near as possible the conclusions arrived at as to the location of the geological formations.

TOPOGRAPHY OF ILLINOIS.

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Before commencing a description of the "Topography of Illinois," it may be of interest to know how the "relief map" was made — which method is here briefly given.

After obtaining the elevations of from twelve to fifteen hundred stations in the State and reducing them to sea level, a large railroad map, printed by Rand, McNally & Co. was stretched tightly upon a board. The elevations of the various stations were marked out upon this map, and common wire finishing nails were driven into the board, at these stations, to accord to a scale of 500 feet to an inch in elevation. The rivers were then laid out according to the surveys given by the Commission. After all this was done, the map was modeled with clay and plaster-of-Paris. From this model a mould of plaster-of-Paris was taken; which, ~~which~~ when the model was removed, was ready for use in making maps. Before the plaster was poured in, the mould was well soaped, thus keeping the map from adhering to it.

The State of Illinois includes an area of 55,531 square miles of fertile land, whose average elevation above the sea is about 760 feet; the lowest point in the State is at Cairo, 288½ feet, and the highest point is Charles Mound, 1226 feet above sea. Charles Mound is in Jo Daviess County, a few miles north of Scale's Mound near the state-line of Wisconsin.

The State lies between 37° and 42°31′ north latitude, and 10°30′ and 14° of the longitude west from Washington — thus, making its extreme

length, 370 miles, and its greatest breadth 204 miles.

The State presents but few scenes of rugged grandeur. A ridge, in the south part running through the northern parts of Union, Johnson, and Pope counties; the bluffs along the rivers; and the driftless regions in Jo Daviess County, however, present the most uneven appearance. The central portion of the State is generally level, varying only about 100 feet in elevation throughout its whole area.

"The Ridge" consists of a number of "fault formations". Commencing at Carbondale at an elevation of 394 feet, and going southward, the surface rises, for about twenty miles, to an elevation varying from 700 to 800 feet; and then slopes off abruptly, with a series of faults, toward the south.

At many places, the streams have cut through the strata to depths of 100 to 300 feet, thus leaving high bluffs, which give the country in the immediate vicinity a very broken appearance.

In the northern part of the State, the surface is composed principally of the Silurian System most of whose formations are readily washed by running waters.

A good example of the erosive action of running water in these rocks is in Jo Daviss County where are found high mounds and ridges capped with Cincinnati and Niagara limestone. The general surface is Trenton rock. The mounds are few in number, far apart; and, as they are made of horizontal strata, tell of the erosion of 300 to 350 feet of solid rock over the entire area.

The location of the State well adapts it for commercial enterprise. For about two-thirds of its distance, the boundary is formed by navigable waters; and is cut in a northeasterly and southwesterly direction by the Illinois River and Michigan Canal.

Lake Michigan skirts its northeastern boundary for sixty miles; the Wabash River forms its south eastern boundary for about one hundred and sixty miles; its southern boundary is washed by the Ohio for more than one hundred & thirty miles; and its entire western boundary is washed for more than five hundred fifty miles by the great Mississippi.

The general slope of the surface is toward the southwest; but for about four miles back from Lake Michigan, it slopes toward the north-east; and for several miles back from the Wabash and Ohio, it slopes toward the south-east and south.

Fever, Apple, Plum, Rock, Edwards, Henderson, Illinois, Kaskaskia, and Big Muddy Rivers are the principal streams that drain the south-west slope; and the Vermillion, Embarras, Little Wabash, Saline, and Cache are the main streams leading southwest and south into the Wabash and Ohio.

The Illinois River, however, drains the greater portion of the State. It has cut a deep and wide bottom extending diagonally across the state. In the bluffs formed by this river the entire geological section of the State is shown.

The surface of the state presents nine different geological formations.

Canadian Group. - Along the Illinois River in the vicinity of

Utica the surface is composed of a limestone from which are made many barrels of cement and some building stone are also taken from it.

For about two miles along the Vermillion River in LaSalle County; along the valley of the Illinois, forming the main portion of the river bluffs from Utica to a point beyond Ottawa; and for several miles along the Rock River in Ogle and Lee counties, a peculiar sandstone, known as the "St Peter's Sandstone" forms the area of the country. This sandstone is found to be very valuable in the manufacturing of glass. It is so little coherent that it may often be quarried with pick and shovel, and this softness has allowed the erosive forces to act freely.

Trenton Group. - The surface of Winnebago, Ogle, and Stephenson Counties; the northwestern portions of Boone, and Lee; the northeastern of Whiteside, and Jo Daviss; and the southeastern portion of Carroll Counties are composed of a limestone, known as the "Trenton Limestone". The caps of the mounds and ridges in this country, prove conclusively that the Cincinnati and Niagara rocks once covered this entire area, but have been carried away by running water. The streams in this rock run from 50 to 300 feet below the base of the mounds. This deep cutting has converted most of the area into a series of barren rugged ridges, uninviting to all but miners. All the lead ores found in the vicinity of Galena and Dubuque are found in this limestone, and occurs in joints and horizontal crevices irregularly distributed throughout the rocks. Many fossils are found in this rock, the most characteristic one being Lingula quadrata.

Cincinnati Group. - A crescent shaped area, whose north horn lies

dolph, Monroe, Jersey, Calhoun, and Pike Counties is composed of the Kinderhook Groupe, which consists of argillaceous and sandy shales with their beds of compact and oolitic limestone.

A portion of the area of Jersey, Green, Scott, Calhoun, Pike, Adams, Warren, and Henderson Counties is composed of the Burlington limestone, which differs entirely in its lithological character, from the Kinderhook Groupe. The rock is made up almost entirely of fossilized remains of Crinoids, and is usually a light gray, buff or brown limestone with a coarsely granular or crystalline structure. One of our best building stones is obtained from this formation.

The greater portion, however,of tte river bluffs is composed of the Keokuk Groupe which immediately succeeds the Burlington Groupe without any strong line of separation between them. There is, however, a change of color; the Burlington rocks being more of a bluish gray color; and also a change in fossils.

The St. Louis Groupe is quite variable in its lithological character. North of the mouth of the Illinois River, the lower portion is everywhere more or less magnesian, and locally becomes argillaceous and shaly. In the extreme southern portion of the state, this rock shows a highly bituminous character and is dark blue or nearly brown in character. In Hardin County, more or less galena and zinc blende are found in this limestone. The country where this formation is found has a peculiarity in the way of"sink holes", which is the dhainage system of the surface. This limestone is readily dissolved by water carrying carbonic acid in so-

in Boone and McHenry Counties, and whose southern horn lies in Henry County, is composed of argillaceous shales which pass locally into argillaceous limestone. The prevailing colors of the beds are light blue or drab, weathering to a light ashen gray. The principal area of this formation, however, extends across McHenry, Boone, DeKalb, Ogle, Lee Whiteside and Bureau Counties; and also an area extending over into Kendall County and the northern part of Grundy County, and south through the eastern part of Will, Kankakee, and Iroquis Counties down into Ford.

Niagara Group. - Although the streams have cut quite deeply in, places, into this rock, and now run between almost vertical banks; yet, as a general thing, erosion has only given to this portion of the state, where this rock is found, a gentle undulation.

Devonian System. - For several miles along the Rock and Mississippi Rivers in the vicinity of Rock Island, along the Mississippi and Illinois in Calhoun County, and along the bluffs of the Mississippi in Jackson, Union and Alexander Counties, the surface is composed of a siliceous limestone, which when decomposed by atmospheric action, forms a white clay resembling common chalk. The surface of this country is broken into sharp riges and precipitous hills, seperated by deep glutches or narrow valleys. Some good building stone is quarried from these rocks.

Sub - Carboniferous System. - The bluffs along the Mississippi are composed of an intermixture of shales, sandstones and limestones which the geologists have seen fit to classify into five different groups.- Kinderhook, Burlington, Keokuk, St. Louis, and Chester.

Much of the surface of Hardin, Johnson, Union, Jackson, Ran-

lution, and by this means, many caves have been formed in it, as the Mammouth Cave.

In the southern part of the state much of the area is composed of the Chester Groups, which attains an aggregate thickness of more than all the other groups of the Sub-Carboniferous put together. It consists of gray, crystalline, and argillaceous limestone, alternating with sandy and argillaceous shales and sandstones; and thins out so rapidly northward, that at Alton it is only about twenty feet thick. In the shales of this formation has been found a small seam of coal, which is the earliest known coal formation in the state.

Carboniferous System.- The entire central portion of the State is underlaid by rocks of the Carboniferous System, which includes the conglomerate and the true Coal Measures.

Lying at the base of the Coal Measures and appearing to have resulted from the culmination of the arenaceous sedimentary accumulations, so conspicuous in the formation of the Chester Group, is the Conglomerate. It consists of massive quartzose sandstone, sometimes nearly white, but more frequently composed in part of rounded quartz pebbles. A large part of the western portion of the State is composed of this formation, and also an area in the east, extending from Paris to La Salle.

Nearly three-quarters of the area of the State is covered over by the true Coal Measures. This formation is made up of sandstones, shales, either sandy, argillaceous, or bituminous, and thin beds of limestone, with coal and its associated fire clays.

The topography of the portion of the State underlaid by the Carboniferous is as varied as the rocks which make up the area. In accord with the character of the strata over which they run, the streams in some places cut deeply, giving to the country an exceedingly rough appearance; while in other places, they run in broad shallow channels but little below the general level. The topography imparted to this part of the State is a little more varied by the "Drift" which here finds its fullest expression.

Tertiary System. - In the southern part of the State, is a certain deposit of stratified sands, shales, and conglomerates which appear to mark the northern boundary of the great Tertiary formation of the Gulf States. Its outcrop is limited to the counties of Alexander, Pulaski, Massac, and Pope. In Alexander county, it contains some good potter's clay, and also a thin bed of lignite. Several species of sharks' teeth have been found in this formation.

Quaternary System. - Nearly the whole surface of the State is covered over by a superficial material, including sands, clays, gravels, and soils which overspread the older formations in almost all portions of the State. This formation is also of greatest importance, economically considered, because it gives origen to the soil.

Above the stratified sands and clays and ancient soils, is found the true "Drift Deposits", consisting of blue, yellow, or brown clays. These deposits are due to the combined action of water currents and moving ice, carrying along and depositing detritus. Owing to this "Glacial Action", the whole central part of the State is a vast prairie whose surface

is comparatively level, and therefore, whose drainage system was formed by the variation of deposition of the material in the backward and forward movement of the glacier. Take for example the surface of Champaign County which contains three "glacial moraines" — one in the northern part and two near the center. The waters in this county flow outward in every direction. Toward the northeast, where rises the Vermillion; towards the southeast, where rises the Embarras; towards the southwest, where rises the Kaskaskia; and toward the northwest, where rises the Sangamon.

This is only one of many similar cases in the State. In fact, most of the drainage systems of the state are formed in this manner; - there being however, one exception, where in Jo Daviess County there is no Drift, and the drainage of the country is formed by the running water cutting glutches and wearing away the surface, till high ridges and mounds separate the different streams.

The entire surface of the State, therefore, is inclined to be level - except two fault formations, one in the south part and the other in the north crossing the Rock River in Ogle County and the Illinois near LaSalle, the only variation being caused by the erosive action of the different streams.

We thus see that Illinois is a vast area sloping toward the southwest and presenting nine different geological formations; that its economical productions are so varied as to give encouragement to almost any enterprise; and has as complete a drainage system as any other country presenting the same variety of formations.

Any further information on the "Topography of Illinois" may be

obtained from the "relief map".